



# MSMR

## Medical Surveillance Monthly Report

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Army Medical Surveillance Activity

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## Outbreak Investigation

### **Outbreak of Pneumococcal Pneumonia Among Ranger Students, Fort Benning, Georgia**

**Introduction:** Acute respiratory diseases (ARD) cause significant morbidity in military populations. Training centers have traditionally been the foci of respiratory disease epidemics due to the close living conditions, the physically and psychologically stressful activities, and the multitude of pathogens brought together by these troops.<sup>1,2</sup> For more than five decades, mass antibiotic prophylaxis has been used with success to interrupt outbreaks, to prevent serious clinical sequelae of streptococcal and meningococcal infections, to reduce infection transmission and nasopharyngeal carriage,<sup>3-6</sup> and to minimize acute febrile respiratory morbidity in general.<sup>7,8</sup> Still, many military medical officers are reluctant to use mass antibiotic prophylaxis, mainly due to concerns regarding side effects (e.g., allergic reactions), unintended consequences (e.g., antibiotic resistance), and costs. While these concerns are important, they must be weighed against the medical and military operational costs associated with recurrent outbreaks.<sup>7-9</sup>

Of historical note, in March 1991, in the aftermath of outbreaks of pneumococcal pneumonia and streptococcal pharyngitis, Ranger students at Fort Benning began to receive two doses of benzathine penicillin (4 weeks apart) at the start of their training. In September 1997, the prophylaxis regimen was reduced to a single dose, and in

March 1998, routine prophylaxis was discontinued altogether. Pneumonia quickly reemerged as a problem among Ranger students, first in the spring of 1998 and then in the winter of 1998-1999 (figure).

**Outbreak investigation:** During the period 4 March to 8 April 1999, an Epidemiologic Consultation (EPICON) team from the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) conducted a two-phase investigation of a pneumonia outbreak in a single cohort of Ranger students at Fort Benning. Activities during the initial phase of the investigation included medical record reviews (of all students in the affected cohort), reviews of case histories and laboratory results, establishment of a case definition, determination of the most likely cause of the outbreak, collection of throat swabs for viral and bacterial cultures, administration of a questionnaire to elicit demographic, training, and risk factor information, and collection of sera for assays of antibodies (IgG and IgM) to *S. pyogenes*, *S. pneumoniae*, *C. pneumoniae* and *M. pneumoniae*. Activities during the follow-up phase included reviews of all incident cases of respiratory illnesses among Ranger students, administration of a follow-up questionnaire, and collection of throat swabs and blood samples to estimate cumulative illness, nasopharyngeal carriage, and infection rates.

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For the investigation, a pneumonia case was defined as a Ranger student with an oral temperature equal to or greater than 100.5°F, cough, adventitious lung sounds, a white blood cell count of 10,000 or greater, and/or a throat or sputum culture positive for *S. pneumoniae*. To quickly control the outbreak, low-dose azithromycin (250 mg per week for 2 weeks) was given to all Ranger students (n=220) in the affected cohort.<sup>10</sup>

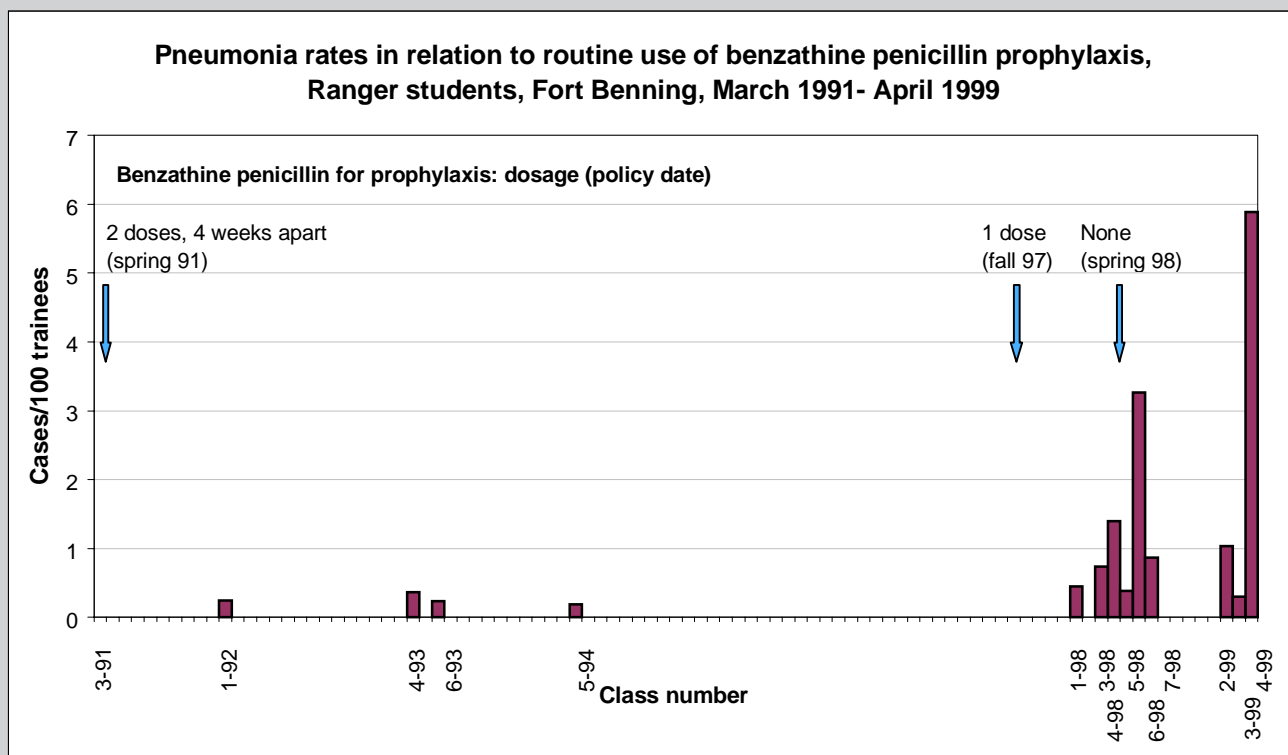
**Results:** Seventy-three percent (n=238) of the 326 students who started Ranger training on 1 February were evaluated between 5 and 9 March (attrition during the first 5 weeks of training was 27%). During the first five weeks of training, there were 29 cases of pneumonia (attack rate: 8.9%) of which 62% were hospitalized; the pneumonia incidence rate was 7.1 per 100 students per month, and nearly two-thirds of the cohort reported significant flu-like or febrile respiratory illnesses. In contrast, during the four weeks between the initial and follow-up visits, only 21 (12%) of the remaining 166 students reported flu-like or febrile respiratory

illnesses ( $p<0.05$ ), and only one case of pneumonia was documented.

Initial bacterial cultures were performed at Martin Army Community Hospital, Fort Benning. Of specimens collected from 18 Ranger students hospitalized with pneumonia, five were positive for *S. pneumoniae*. Of throat cultures done on 220 students still in training on 7 March, 30 (13.6%) were positive for *S. pneumoniae*, 18 (8.2%) for non-beta hemolytic streptococci, and 3 (1.4%) for group A beta-hemolytic streptococci (GABHS). In contrast, throat cultures (n=166) done at the end of Ranger training revealed 7 (4.2%), 26 (15.7%) and 0 (0%) isolates of *S. pneumoniae*, non-beta hemolytic streptococci, and GABHS, respectively (table, page 8).

Of the 30 *S. pneumoniae* isolates obtained from the initial throat culture survey, 18 (60%) were sensitive and twelve (40%) had intermediate resistance to penicillin on *in vitro* testing. All isolates were sensitive to erythromycin. Of the seven *S. pneumoniae* isolates obtained during the follow-

*Continued on page 8*



**TABLE I. Selected sentinel reportable diseases, US Army medical treatment facilities\*  
April, 1999**

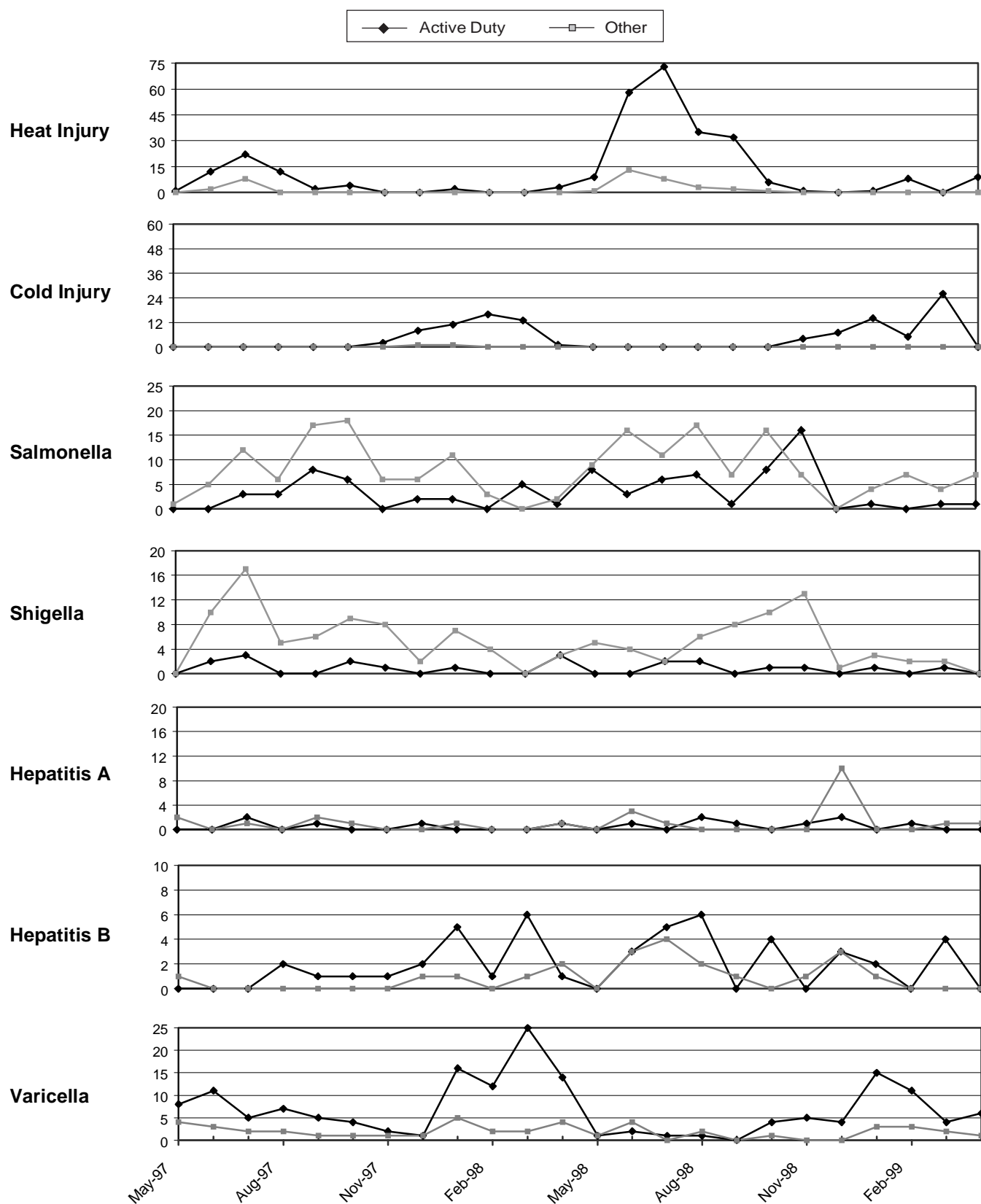
Reporting MTF/Post**	Total number of reports submitted April, 1999	Environmental Injuries		Viral Hepatitis		Salmonellosis		Shigella		Varicella	
		Active Duty				Active Duty	Other	Active Duty	Other	Active Duty	Other Adult
		Heat	Cold	A	B						
		Cum. 1999	Cum. 1999	Cum. 1999	Cum. 1999	Cum. 1999	Cum. 1999	Cum. 1999	Cum. 1999	Cum. 1999	Cum. 1999
NORTH ATLANTIC RMC											
Walter Reed AMC	11	0	0	1	0	0	0	0	0	2	0
Aberdeen Prov. Ground, MD	5	0	0	0	0	0	0	0	0	1	0
FT Belvoir, VA	21	0	0	0	0	0	2	0	0	0	0
FT Bragg, NC	90	8	8	0	0	1	5	0	0	1	0
FT Drum, NY	21	0	15	0	0	0	0	0	0	5	1
FT Eustis, VA	15	0	1	0	0	0	0	0	0	1	0
FT Knox, KY	13	0	1	0	0	0	1	0	0	1	0
FT Lee, VA	9	0	0	0	0	0	0	0	0	0	0
FT Meade, MD	0	0	0	0	0	0	0	0	0	1	0
West Point, NY	1	0	0	0	0	0	0	0	0	0	1
GREAT PLAINS RMC											
Brooke AMC	23	0	0	1	3	0	2	0	4	1	1
Beaumont AMC	0	2	0	0	0	0	0	0	0	0	0
FT Carson, CO	82	0	0	0	0	0	2	0	0	0	0
FT Hood, TX	21	0	0	0	1	1	0	0	0	1	0
FT Huachuca, AZ	2	0	0	0	0	0	0	0	0	0	0
FT Leavenworth, KS	0	0	0	0	0	0	0	0	0	0	0
FT Leonard Wood, MO	14	0	3	0	1	0	1	0	0	5	4
FT Polk, LA	16	0	0	0	0	0	0	0	0	0	0
FT Riley, KS	16	0	1	0	0	0	0	0	0	0	0
FT Sill, OK	26	1	0	0	6	0	0	0	0	6	0
SOUTHEAST RMC											
Eisenhower AMC	14	0	0	0	0	0	0	0	0	0	1
FT Benning, GA	18	10	0	1	0	0	0	1	0	0	0
FT Campbell, KY	43	0	2	0	0	0	4	2	2	0	1
FT Jackson, SC	16	0	0	0	0	0	0	0	0	2	0
FT McClellan, AL	0	0	0	0	0	0	0	0	0	0	0
FT Rucker, AL	6	0	0	0	0	0	0	0	0	0	0
FT Stewart, GA	45	1	0	0	0	0	1	0	0	4	0
WESTERN RMC											
Madigan AMC	0	0	0	0	0	0	4	0	0	0	0
FT Irwin, CA	3	0	0	0	2	0	0	0	0	0	0
FT Wainwright, AK	2	0	42	0	1	0	0	0	0	2	0
OTHER LOCATIONS											
Tripler	67	0	0	0	0	1	2	0	1	0	0
Europe	21	0	2	0	3	1	1	0	0	8	0
Korea	13	0	8	0	14	0	0	0	0	0	0
Total	634	22	83	3	31	4	25	3	7	41	9

\* Based on date of onset.

\*\* Reports are included from main and satellite clinics. Not all sites reporting.

Date of Report: 7-May-99

**FIGURE I. Selected sentinel reportable diseases, US Army medical treatment facilities\***  
**Cases per month, May 97 - Apr 99**



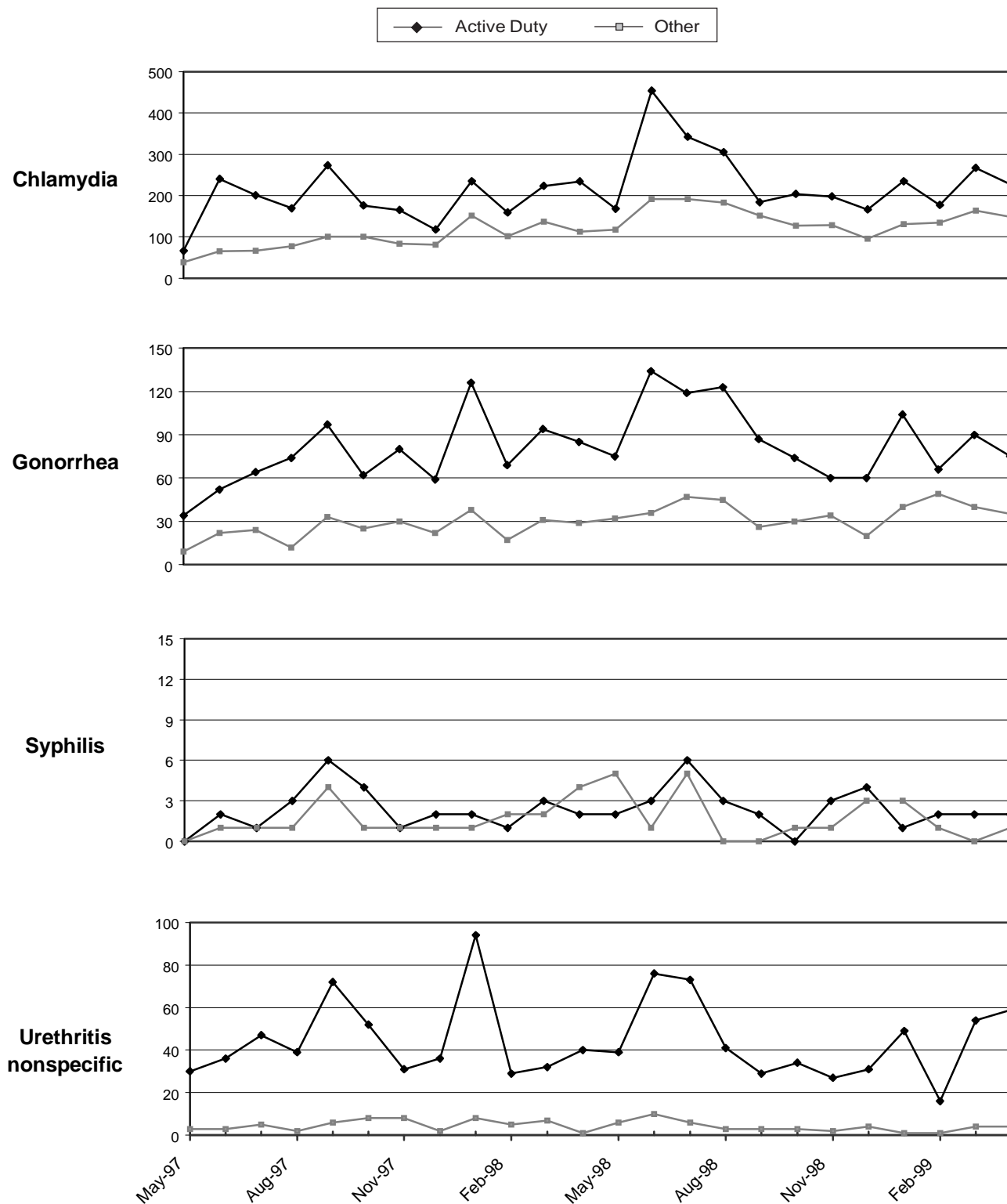
\* Reports are included from main and satellite clinics. Not all sites reporting.

**TABLE II. Reportable sexually transmitted diseases, US Army medical treatment facilities\*  
April, 1999**

Reporting MTF/Post**	Chlamydia		Urethritis non-spec.		Gonorrhea		Syphilis Prim/Sec		Syphilis Latent		Syphilis Tertiary		Syphilis Congenital	
	Cur. Month	Cum. 1999	Cur. Month	Cum. 1999	Cur. Month	Cum. 1999	Cur. Month	Cum. 1999	Cur. Month	Cum. 1999	Cur. Month	Cum. 1999	Cur. Month	Cum. 1999
<b>NORTH ATLANTIC RMC</b>														
Walter Reed AMC	7	32	0	1	1	6	1	1	0	0	0	1	0	0
Aberdeen Prov. Ground, MD	4	7	0	2	1	6	0	0	0	0	0	0	0	0
FT Belvoir, VA	10	40	0	0	5	19	0	0	0	0	0	0	0	0
FT Bragg, NC	32	202	23	60	17	87	0	0	0	0	0	0	0	0
FT Drum, NY	13	50	1	1	5	28	0	0	0	1	0	0	0	0
FT Eustis, VA	14	60	0	0	1	17	0	0	0	0	0	0	0	0
FT Knox, KY	8	50	0	0	4	28	0	0	0	0	0	0	0	0
FT Lee, VA	8	46	0	0	1	13	0	1	0	0	0	0	0	0
FT Meade, MD	0	25	0	0	0	1	0	0	0	0	0	0	0	0
West Point, NY	1	9	0	0	0	1	0	0	0	0	0	0	0	0
<b>GREAT PLAINS RMC</b>														
Brooke AMC	15	60	0	1	5	23	0	0	0	0	0	0	0	0
Beaumont AMC	0	28	0	1	0	3	0	0	0	0	0	0	0	0
FT Carson, CO	63	173	9	28	5	21	0	0	0	0	0	0	0	0
FT Hood, TX	15	186	0	59	5	69	0	3	0	1	0	1	0	0
FT Huachuca, AZ	2	6	0	0	0	1	0	0	0	0	0	0	0	0
FT Leavenworth, KS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FT Leonard Wood, MO	7	30	1	3	3	11	0	1	0	3	0	0	0	0
FT Polk, LA	15	68	0	0	0	7	0	2	1	1	0	0	0	0
FT Riley, KS	10	74	0	0	5	25	0	0	0	0	0	0	0	0
FT Sill, OK	16	68	4	16	5	29	0	0	0	0	0	0	0	0
<b>SOUTHEAST RMC</b>														
Eisenhower AMC	11	68	0	0	1	5	0	0	0	0	0	1	0	0
FT Benning, GA	8	43	0	0	7	42	0	1	0	0	0	0	0	0
FT Campbell, KY	33	107	0	0	8	45	0	0	0	0	0	0	0	0
FT Jackson, SC	12	105	0	0	3	19	0	1	0	0	0	0	0	0
FT McClellan, AL	0	1	0	0	0	0	0	0	0	0	0	0	0	0
FT Rucker, AL	4	16	0	0	2	5	0	0	0	0	0	0	0	0
FT Stewart, GA	7	50	25	68	12	40	0	0	0	0	0	0	0	0
<b>WESTERN RMC</b>														
Madigan AMC	0	104	0	24	0	23	0	0	0	0	0	0	0	0
FT Irwin, CA	3	6	0	0	0	0	0	0	0	0	0	0	0	0
FT Wainwright, AK	1	21	0	0	0	3	0	0	0	0	0	0	0	0
<b>OTHER LOCATIONS</b>														
Tripler	37	131	0	0	7	37	0	0	0	0	0	0	0	0
Europe	12	181	0	0	7	57	0	0	0	1	0	0	0	0
Korea	5	119	0	0	0	5	1	7	0	0	0	0	0	0
<b>Total</b>	<b>373</b>	<b>2166</b>	<b>63</b>	<b>264</b>	<b>110</b>	<b>676</b>	<b>2</b>	<b>17</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>

\* Reports are included from main and satellite clinics. Not all sites reporting.

**FIGURE II. Reportable sexually transmitted diseases, US Army medical treatment facilities\***  
**Cases per month, May 97 - Apr 99**



\* Reports are included from main and satellite clinics. Not all sites reporting.



Bacterial isolates from throat swabs of Ranger students, March and April 1999		
Agent	March 1999	April 1999
<i>S. pneumonia</i>	30 (13.6%)	7 (4.2%)
Non-group A beta hemolytic strep	18 (8.2%)	17 (10.2%)
<i>S. pyogenes</i>	3 (1.4%)	0 (0.0%)
<i>H. influenza</i>	0 (0.0%)	4 (2.4%)
Total number tested	220	166

Continued from page 3

up throat culture survey, 4 (57%) were sensitive and 3 (43%) had intermediate resistance to penicillin. Two follow-up isolates were resistant to azithromycin. In addition, all *S. pneumoniae* isolates (mostly serotype 9) were represented in the 23-valent vaccine.

#### Recommendations and short-term follow-up:

The outbreak rapidly subsided coincident with the initiation of mass azithromycin treatment. The EPICON team recommended implementation of the following additional measures: (a) administration of 500 mg of azithromycin each week for the remainder of the affected cohort's Ranger training; (b) administration of one dose of pneumococcal vaccine and 1.2 million units of benzathine penicillin to members of the Ranger class beginning on 8 March; and, (c) in the absence of recurrent problems, no vaccine or antibiotic prophylaxis for the class beginning on 5 April. To date, there have been no documented pneumonia cases among students in the March or April Ranger classes.

**Discussion:** This investigation documented that the carriage of *S. pneumoniae* was significantly reduced after two rounds (one week apart) of mass treatment with low-dose azithromycin. More importantly, clinically-overt illness (e.g., pneumonia) and associated military training disruptions were significantly reduced during the intervention.

In response to this outbreak, the local medical staff and the EPICON team developed guidelines for the long-term control of pneumococcal and other bacterial respiratory illnesses among Ranger students. The guidelines prescribe: (a) administra-

tion of pneumococcal vaccine to all students who begin Ranger training between 1 October and 31 March; (b) administration of 1.2 million units of benzathine penicillin to all non-allergic students who begin Ranger training between 1 October and 31 March; and, (c) continuous surveillance of rates and trends of pneumonia, pharyngitis, bronchitis, cellulitis and/or febrile, flu-like illnesses among Ranger students, with special emphasis during the fall and winter seasons.

*Report and comments submitted by Stephen Craig, LTC, MC, Dr. Shellie Kolavic, Deborah Hastings, CPT, MSC, Brian Alsip, CPT, MC, Jose Sanchez, COL, MC, USACHPPM, and Lester Martinez-Lopez, COL, MC, Steve Salerno, MAJ, MC, George James, CPT, MSC, Fort Benning. Laboratory support for this investigation provided by Gregory C. Gray, CAPT, MC, USN, US Navy Health Research Center, San Diego, CA.*

#### References

- Gray, GC. Acute respiratory disease in the military. *Fed Prac*, Jan 95.
- Gray, GC, Callahan, JD, Hawksworth, AW, Fisher, CA, Gaydos, JC. Respiratory diseases among US military personnel: strategies to counter emerging threats. *Emerg Infect Dis*, 1999, 5:3(May-June).
- Goerner, JR, Massel, BF, Jones, TD. Use of penicillin in the treatment of carriers of beta-hemolytic streptococci among patients with rheumatic fever. *NEJM*, 1947, 237(16):576-580.
- Brink, WR, Rammelkamp, CH, Denny, FW, Wannamaker, LW. Effect of penicillin and aureomycin on the natural course of streptococcal tonsillitis and pharyngitis. *Am J Med*, 1951, 10:300-308.
- Wannamaker, LW, Rammelkamp, CH, Denny, FW, et al. Prophylaxis of acute rheumatic fever by treatment of the preceding streptococcal infection with various amounts of depot penicillin. *Am J Med*, 1951, 10:673-695.
- Wannamaker, LW, Denny, FW, Perry, WD, Rammelkamp, CH, et al. The effect of penicillin prophylaxis on streptococcal disease rates and the carrier state. *NEJM*, 1953, 249(1):1-7.
- Gunzenhauser, JD, Brundage, JF, McNeil, JG, Miller, RN. Broad and persistent effects of benzathine penicillin G in the prevention of febrile acute respiratory disease. *J Infect Dis*, 1992, 166 (August), 365-73.
- Brundage, JF, Gunzenhauser, JG, Longfield, JN, Rubertone, MV, Ludwig, SL, Rubin, FA, Kaplan, EL. Epidemiology and control of acute respiratory diseases with emphasis on Group A beta hemolytic streptococcus: a decade of US Army experience. *Pediatrics*, 1996, 97 (supplement), 964-70.
- Martinez-Lopez, LE, Friedl, KE, Moore, RJ, Kramer, TR. A longitudinal study of infections and injuries of Ranger students. *Milit Med*, 1993, 158(7):433-437.
- Gray, GC, McPhate, DC, Leinonen, M, et al. Weekly oral azithromycin as prophylaxis for agents causing acute respiratory disease. *Clin Infect Dis*, 1998, 10:103-110.

### Local Preventive Intervention

## **Varicella Primary Prevention Program, Fort Knox, Kentucky**

*Background:* Chickenpox is a highly contagious disease, mainly of children, that is caused by infection with varicella zoster virus (VZV). In most cases, a single episode of chickenpox confers lifelong protection against recurrent episodes. There are approximately 4 million cases of chickenpox per year in the United States, more than 90% among children younger than 15 years old. Clinical manifestations of VZV infection vary with age; for example, hospitalizations and deaths (as from varicella pneumonia) are much more common among adults than children.<sup>1</sup>

Between 1990 and 1997, there were 8,656 hospitalizations of active duty servicemembers for chickenpox or its complications. During that period, there were 3,597 varicella-related hospitalizations of soldiers, nearly 90% of whom were junior enlisted. Since 1997, of all infectious and parasitic diseases, chickenpox has been the leading cause of hospitalizations of soldiers. Serologic studies have documented that 4%-7% of new accessions to the military services lack evidence of prior infection with VZV and thus are presumed susceptible to chickenpox.<sup>2-4</sup> In a recent military outbreak, the secondary attack rate among susceptible trainees housed in open-bay barracks was 71%.<sup>5</sup> Thus, varicella remains a significant threat to the orderly, efficient, and effective training of soldiers.

*Varicella vaccine:* In March 1995, a live attenuated varicella virus vaccine was licensed for use in the US. The vaccine is estimated to be 70%-90% effective in preventing chickenpox and more than 95% effective in preventing severe disease after VZV infection. The Advisory Committee on Immunization Practices of the US Public Health Service recommended that "vaccination should be considered for susceptible persons who are at high risk of exposure" such as "military personnel."<sup>1</sup> Currently, the US Army has no official policy regarding the use of varicella vaccine.

*Fort Knox Varicella Primary Prevention Program (VPPP):* In October 1998, the medical staff at Fort Knox, Kentucky, initiated a Varicella Primary Prevention Program (VPPP) to minimize the military operational and medical costs associated with chickenpox among trainees. In the recent past, the Armor Training Center at Fort Knox had experienced approximately 1.9 cases of chickenpox per 1,000 trainees. Based on this experience and in the absence of a primary prevention program, the medical staff estimated that 28 chickenpox cases would occur during fiscal year 1999 among the anticipated 15,000 new trainees. In addition, they anticipated that all trainee chickenpox cases would require hospitalization (4 days each at \$500 per day) and half would require "recycling" in their training (\$20,000 per recycled trainee). Thus, in the absence of an effective intervention, total chickenpox-related costs for the year were anticipated to be \$336,000.

To counter the chickenpox threat, the medical and training center staffs planned and implemented the VPPP which was based on the model described by Jerant and colleagues at Eisenhower Army Medical Center, Fort Gordon, Georgia.<sup>4</sup> In the reception station, as part of routine medical processing, each new trainee completed a chickenpox questionnaire. Trainees who provided a positive chickenpox history were considered immune to VZV (Jerant and colleagues found that 98.5% of new trainees with a positive chickenpox history had serologic evidence of immunity to VZV<sup>4</sup>). Trainees who provided a negative or uncertain history had serum samples tested by an IgG ELISA (Wampole Laboratories, Cranbury, N.J.) to determine their immunologic status (cost per assay: \$8.50). Trainees with negative serologic tests were considered nonimmune ("susceptible") and were immunized (cost per immunization: \$32.50) prior to their assignments to the Armor Training Brigade.

**Results:** During the first six months of the VPPP, 4,201 trainees processed through the reception station at Fort Knox. Nearly one-fourth of the trainees were African-American (22%), approximately two-thirds were Caucasian (67%), and the rest (12%) represented other racial and ethnic subgroups. Eighty-two percent of the trainees were not married, and 77% were high school graduates. The trainees represented a broad geographic distribution. The states most represented were California (9%), Texas (8%), New York (6%), Florida (5%), and Ohio (4%).

Less than one-fifth of the trainees (n=775, 18.5%) required serologic testing, and only 130 required immunization (16.8% of all tested, 3.1% of all trainees). Two chickenpox cases were diagnosed during the VPPP. One case resulted from an administrative error (i.e., a trainee with a negative VZV titer was not immunized), and the other resulted from an infection acquired prior to the program's start. Thus, there were no documented vaccine failures.

The hospitalization and military training costs avoided were estimated as \$72,000. Marginal costs of the VPPP (including serologic tests and immunizations) were \$10,813. Thus, the net savings for the first six months of the VPPP were estimated as \$61,187, and the cost per case of chickenpox avoided was estimated as \$1,802.

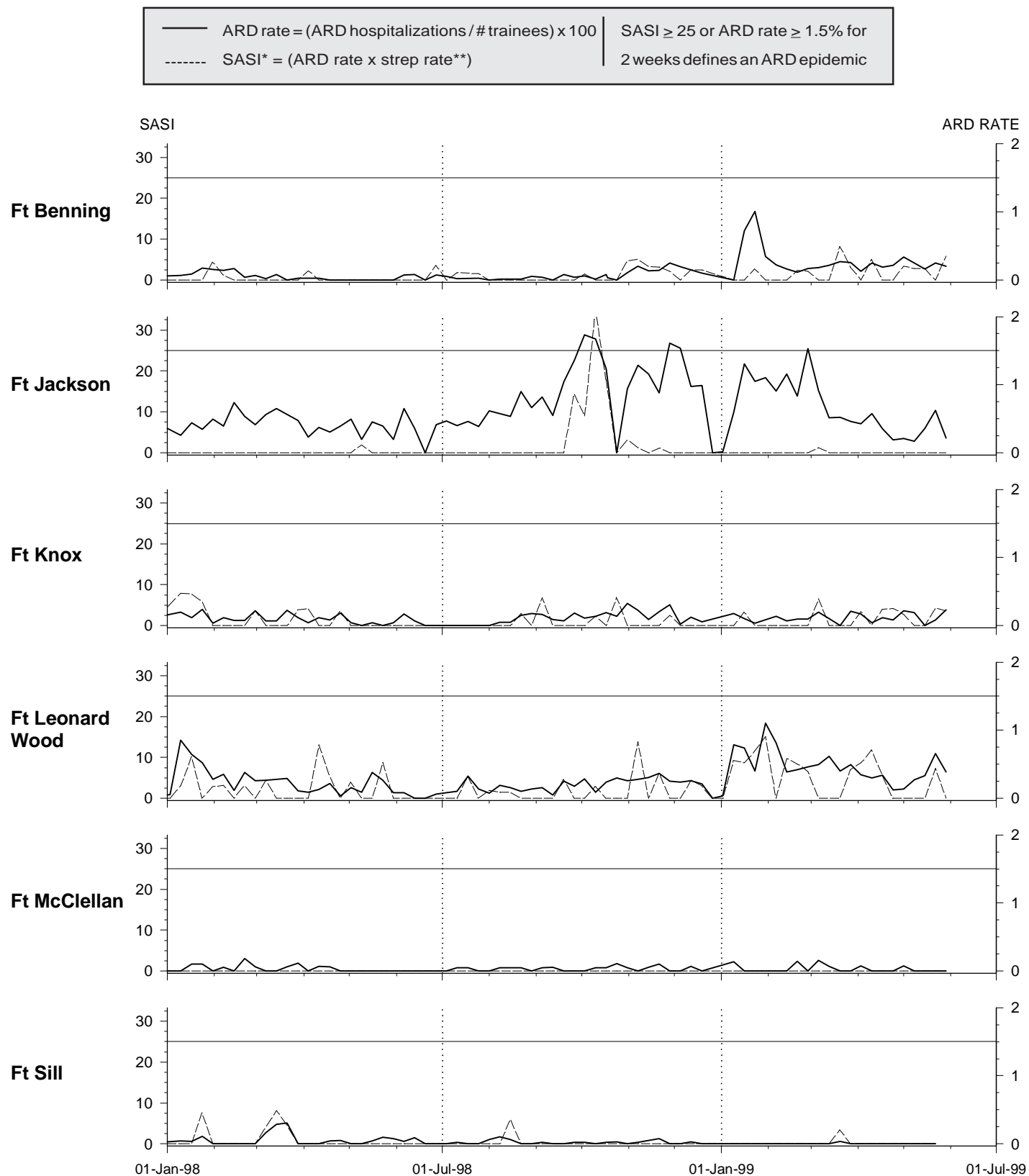
**Editorial comment:** The Fort Knox Varicella Primary Prevention Program (VPPP) is an innovative, locally planned and executed, targeted prevention program with significant potential to avoid costs and to decrease military training disruption. Early results of the VPPP are favorable, and its application to other initial entry training centers should be considered. Continued follow-up of the Fort Knox experience will allow more precise estimates of the program's long-term costs and benefits.

*Report provided by David W. Niebuhr, LTC, MD, MPH, Chief, Preventive Medicine Service, Ireland Army Community Hospital, Fort Knox, Kentucky.*

#### References

1. Centers for Disease Control and Prevention. Prevention of varicella: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*, 1996, 45:RR11(12 July), 1-25.
2. Kelley PW, Petrucci BP, Stehr-Green P, Erickson RL, Mason CJ. The susceptibility of young adult Americans to vaccine-preventable infections: a national serosurvey of US Army recruits. *JAMA*, 1991, 266:19(Nov 20), 2724-9.
3. Struwing JP, Hyams KC, Tueller JE, Gray GC. The risk of measles, mumps, and varicella among young adults: a serosurvey of US Navy and Marine Corps recruits. *Am J Public Health*, 1993, 83:12(Dec), 1717-20.
4. Jerant AF, DeGaetano JS, Epperly TD, Hannapel AC, Miller DR, Lloyd AJ. Varicella susceptibility and vaccination strategies in young adults. *J Am Board Fam Pract*, 1998, 11:4(Jul-Aug), 296-306.
5. Longfield JN, Winn RE, Gibson RL, Juchau SV, Hoffman PV. Varicella outbreaks in Army recruits from Puerto Rico. Varicella susceptibility in a population from the tropics. *Arch Intern Med*, 1990, 150:5(May), 970-3.

**Figure III. Acute respiratory disease (ARD) surveillance update  
US Army initial entry training centers**



\* SASI (Strep ARD Surveillance Index) is a reliable predictor of serious strep-related morbidity

\*\* Strep rate = (Group A beta-hemolytic strep(+) / # cultures) x 100

*Surveillance Trends*

## Completeness and Timeliness of Reporting of Notifiable Medical Conditions, US Army, January 1998 – December 1998

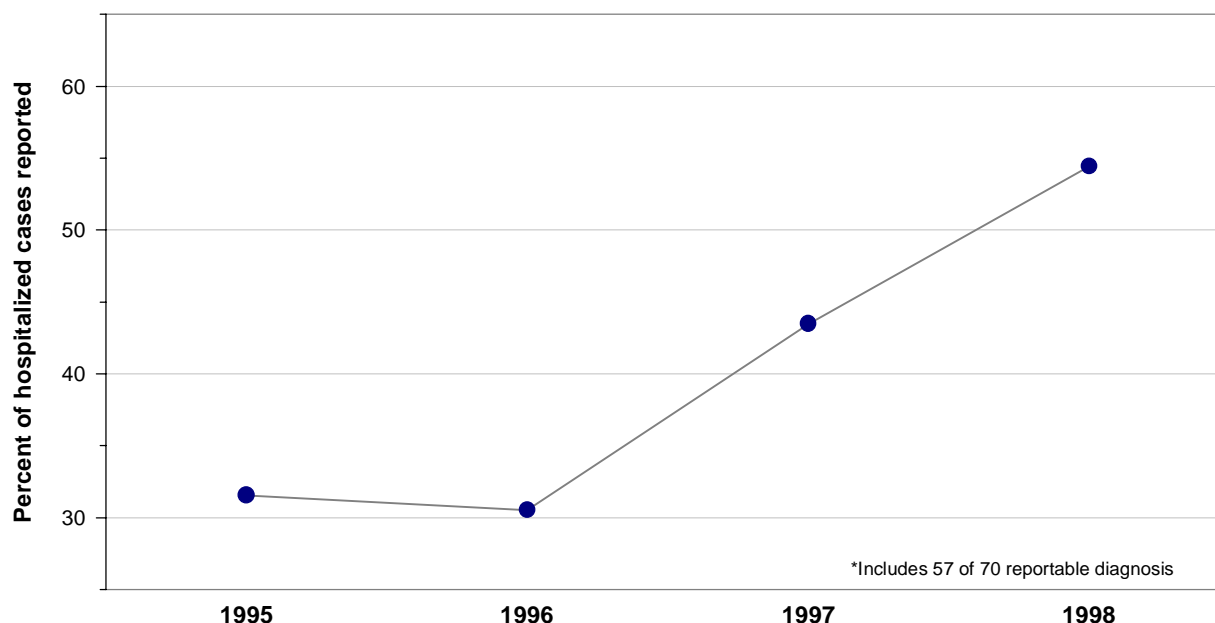
The December 1998 issue of the MSMR reviewed the background and basis of the revised tri-service consensus list of notifiable medical events/conditions. The same issue described updated methodologies used by the Army Medical Surveillance Activity (AMSA) for tracking the completeness and timeliness of reporting. This report summarizes results of the fifth semiannual assessment of Armywide reporting of notifiable conditions.

**Completeness of reporting, hospitalizations overall:** During the period 1 January 1998 to 31 December 1998, there were 338 hospitalizations of active duty soldiers for conditions considered reportable (based on ICD-9-CM coded discharge diagnoses). The largest number of reportable hospitalizations were for heat injuries (n=134),

varicella (n=100), and malaria (n=29). Of all hospitalized and presumably notifiable cases, 184 (54.4%) were reported through the Army's automated disease reporting system. The completeness of reporting in 1998 exceeded that in 1997 and extended a two year trend of more complete reporting (figure 1).

**Completeness of reporting, hospitalizations by diagnosis** (table 1): More than 80% of hospitalizations for cold injuries, dengue fever, lyme disease, tetanus, malaria, and gonococcal disease were appropriately reported. In contrast, five conditions—heat injuries, pneumococcal pneumonia, influenza, carbon monoxide poisoning, and varicella—accounted for 86.4% of all unreported presumably notifiable hospitalizations.

**Figure 1. Completeness of reporting, reportable hospitalizations\* among active duty soldiers, 1990-1998**



**Table 1. Completeness of reporting, reportable hospitalizations among active duty soldiers, January - December 1998**

Reportable Event	Reportable hospitalizations	Number reported	Percent reported
Cold weather injury	6	6	100.0%
Dengue fever	1	1	100.0%
Lyme disease	1	1	100.0%
Tetanus	1	1	100.0%
Malaria	29	25	86.2%
Gonorrhea	6	5	83.3%
Hepatitis A	3	2	66.7%
Heat injury	134	85	63.4%
Hepatitis B	4	2	50.0%
Salmonellosis	4	2	50.0%
Varicella	100	48	48.0%
Tuberculosis, pulmonary	5	2	40.0%
Carbon monoxide poisoning	9	3	33.3%
Influenza	11	1	9.1%
Amebiasis	1	0	0.0%
Hepatitis C	1	0	0.0%
Leishmaniasis	1	0	0.0%
Measles	1	0	0.0%
Pneumococcal pneumonia	16	0	0.0%
RMSF	1	0	0.0%
Shigellosis	1	0	0.0%
Syphilis	1	0	0.0%
Vaccine, adverse event	1	0	0.0%
<b>Total</b>	<b>338</b>	<b>184</b>	<b>54.4%</b>

*Completeness of reporting, hospitalizations by site* (table 2, page 14): There continued to be significant disparity of reporting completeness across reporting sites. For example, eight of 24 sites reported more than 60% of their notifiable hospitalized cases during 1998. Fort Knox, Kentucky (90.0%), Fort Leonard Wood, Missouri (87.5%), Fort Stewart, Georgia (78.6%), Fort Bliss, Texas (75.0%), Fort Bragg, North Carolina (68.8%), Fort Carson, Colorado (66.7%), Fort Hood, Texas (64.3%), and Korea (61.5%) had the highest reporting completeness rates. In contrast,

there were six sites that reported only 0.0% to 25.0% of their hospitalized notifiable cases for the year.

*Timeliness of reporting, hospitalized cases* (figure 2, page 14): Since 1995, there has been a gradual but consistent trend towards less timely reporting of hospitalized notifiable cases. For example, in 1995 and 1996, 62% of hospitalized cases were reported within one week of hospital discharge, while in 1998, 50.8% of hospitalized cases were reported within one week.

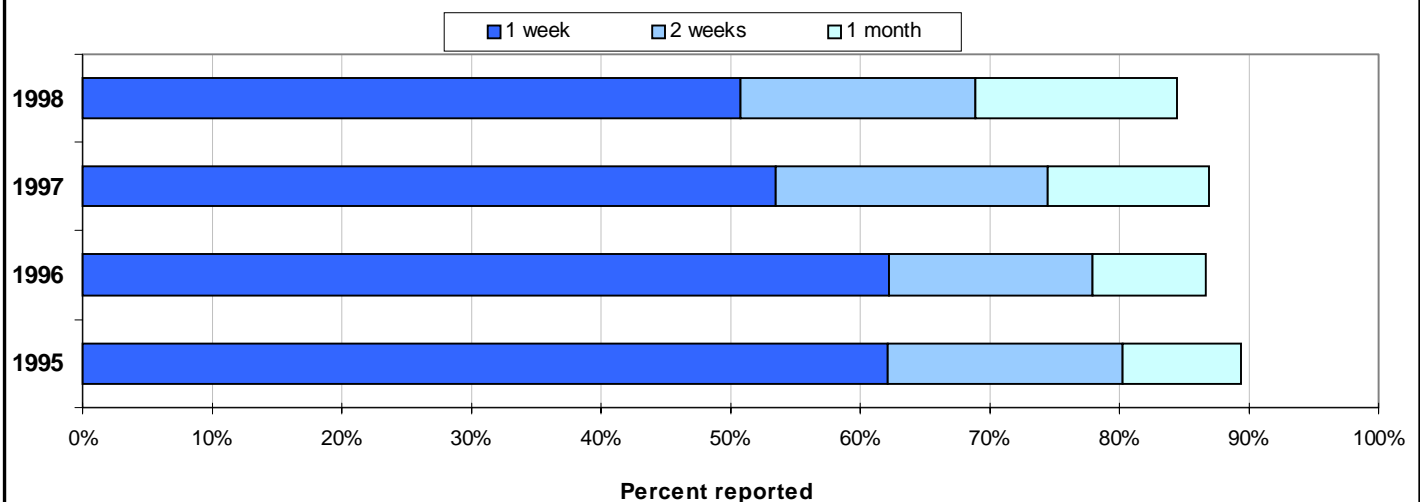
*Completeness of reporting, ambulatory cases* (table 3, page 15): Heat and cold injuries diag-



**Table 2. Completeness of reporting, reportable hospitalizations among active duty soldiers, by MTF, January - December 1998**

MTF	Reportable hospitalizations			All reports		
	Number reported	Total	Number reported/ total number	Reports received Jan - Dec 1998	Non-STD reports received	STD reports received
A	18	20	90.0%	325	40	285
B	7	8	87.5%	212	48	164
C	22	28	78.6%	513	43	470
D	6	8	75.0%	412	34	378
E	22	32	68.8%	453	267	186
F	8	12	66.7%	753	45	708
G	9	14	64.3%	1785	229	1556
H	16	26	61.5%	330	161	169
I	29	52	55.8%	355	63	292
J	6	11	54.5%	277	126	151
K	9	17	52.9%	1394	320	1074
L	2	4	50.0%	604	52	552
M	2	4	50.0%	331	18	313
N	2	4	50.0%	605	116	489
O	9	20	45.0%	203	22	181
P	2	5	40.0%	271	61	210
Q	7	19	36.8%	360	27	333
R	1	3	33.3%	233	44	189
S	1	4	25.0%	94	25	69
T	2	10	20.0%	632	107	525
U	2	14	14.3%	328	37	291
V	2	16	12.5%	322	11	311
W	0	6	0.0%	47	5	42
X	0	1	0.0%	299	29	270
<b>Total</b>	<b>184</b>	<b>338</b>	<b>54.4%</b>	<b>11138</b>	<b>1930</b>	<b>9208</b>

**Figure 2. Timeliness of reporting, reportable hospitalizations among active duty soldiers, 1995-1998**



nosed in outpatient settings were reported more completely in 1998 than in 1997. As in 1997, very few outpatient diagnoses of carbon monoxide poisoning were reported through the notifiable reporting system.

*Timeliness of reporting, ambulatory cases* (figure 3): Reporting of notifiable ambulatory cases (of selected diagnoses used for periodic assessments) was slightly less timely in 1998 compared to 1997. Still, more than half of all reported ambulatory cases were reported within one week, and more than two-thirds were reported within two weeks.

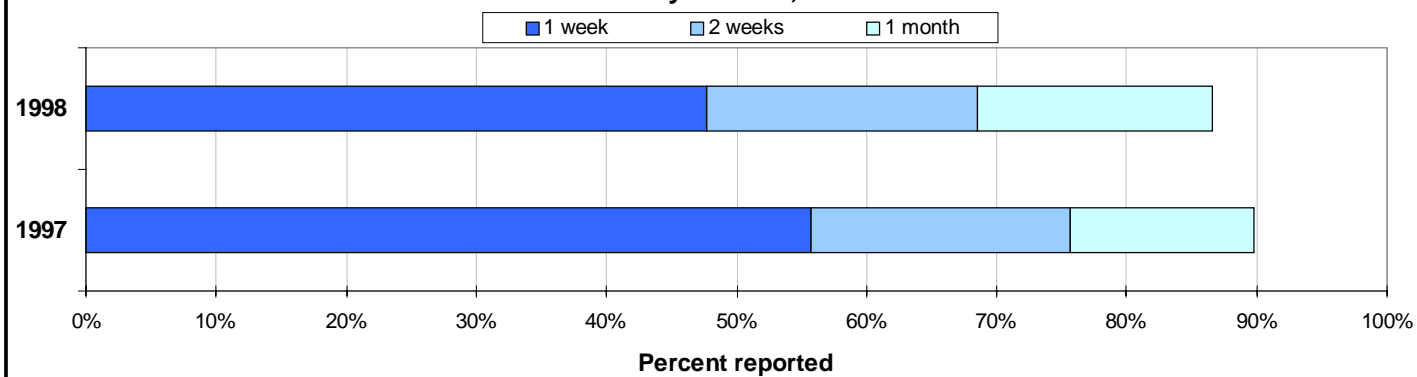
**Comment:** For the past 2 1/2 years, the AMSA has periodically compared reported cases of notifiable

conditions with counterpart diagnoses reported through standard inpatient and/or ambulatory data systems. It is likely that estimates of completeness by this method underestimate actual reporting completeness since (a) some ICD-9-CM codes are not specific for the reportable condition alone (i.e., they include clinical states that are not reportable); and (b) diagnoses made in inpatient and ambulatory settings may not be based on the criteria required for a confirmed reportable case (e.g., a soldier evaluated for carbon monoxide exposure may receive an outpatient diagnosis, but not fulfill criteria for confirmation of carbon monoxide poisoning). Still, notifiable disease reporting Armywide seems to be gradually but steadily improving.

**Table 3. Completeness of reporting, selected reportable ambulatory visits among active duty soldiers, 1997-1998**

Reportable Event	1997			1998		
	Reportable visits	Number reported	Percent reported	Reportable visits	Number reported	Percent reported
<b>Environmental injuries</b>						
Carbon monoxide poisoning	50	3	6.0%	50	1	2.0%
Cold weather injury	217	23	10.6%	251	46	18.3%
Heat injury	357	67	18.8%	639	157	24.6%
<b>Total</b>	<b>618</b>	<b>82</b>	<b>13.3%</b>	<b>822</b>	<b>141</b>	<b>17.2%</b>
<b>Sexually transmitted diseases</b>						
Chlamydia trachomatis, genital	462	134	29.0%	699	250	35.8%
Gonorrhea	662	295	44.6%	778	371	47.7%
Syphilis	84	3	3.6%	233	4	1.7%
Urethritis, non-gonococcal	873	248	28.4%	989	256	25.9%
<b>Total</b>	<b>1605</b>	<b>555</b>	<b>34.6%</b>	<b>2013</b>	<b>666</b>	<b>33.1%</b>

**Figure 3. Timeliness of reporting, selected reportable ambulatory visits among active duty soldiers, 1997-1998**





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